DDA OCCASIONAL PAPERS

No. 10, March 2006

United Nations

Verifying Non-Proliferation & Disarmament Agreements Today

Panel Discussion
United Nations, New York
20 October 2005

Department for Disarmament Affairs

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PREFACE

On 20 October 2005, the Department for Disarmament Affairs (DDA) and the Government of Canada hosted a panel discussion on *Verifying Disarmament and Non-Proliferation Agreements Today*. DDA organized the discussion with the Government of Canada, which has taken a leading role in the promotion of multilateral verification of disarmament and non-proliferation agreements for many years.

We had two purposes in mind. First, in the light of the efforts over recent years to give more substance to the debates carried out during the thematic discussions in the First Committee, we believed that hearing experts from outside the immediate First Committee setting could raise the level of discussion by offering the most current technical information available. Second, by exploring issues outside the normal range of thinking on the subject, we hoped to begin an informal "scoping exercise" for the panel of government experts (PGE), set up by General Assembly resolution 59/60. The terms of that resolution call for the PGE to examine the broad issue of verification in all its aspects, including the role of the United Nations in the field, and to report back to the Assembly in the fall of 2006. Thus, one of the experts was asked to speak on the role of the United Nations in the verification of arms embargoes, which mainly relates to small arms transfers and is instituted by the Security Council.

In preparing the panel discussion, DDA and Canada were mindful of the significant political and technological developments in the field of multilateral verification of compliance with disarmament, non-proliferation and arms control agreements that had occurred since the two United Nations expert groups on verification in 1990 and 1995, respectively. Over the last ten years, this form of verification has achieved notable successes in assuring the international community of

States' compliance with their obligations under treaties. Conversely, it has also registered unsettling setbacks. In many ways, too, the march of science and technology has also had an impact on this field, especially in information and telecommunications and public access to information.

The PGE has been given a broad mandate to tackle verification of arms agreements in all its aspects, that is, in all its complexities. The panel discussion and this paper which follows were intended to stimulate thinking on some of those aspects and did not aim to be exhaustive.

Patricia Lewis of the United Nations Institute for Disarmament Research reviews the impact of the two previous governmental expert studies, and points to the substantially different political perspectives now being brought to bear on the issue. Jan Lodding of the International Atomic Energy Agency outlines the technology available today for verifying nuclear activities and materials in connection with the obligations entered into by States under the Nuclear Non-Proliferation Treaty and safeguards agreements. Angela Woodward of the Verification Research, Training and Information Centre takes us on a tour of how the new and emerging technologies can enhance States' capacities to verify arms control agreements, and addresses the inroads being made in societal monitoring of those agreements. While there exists examples of verification of conventional arms agreements, Brian Wood of Amnesty International describes possible ways of monitoring and verifying arms embargoes imposed by the Security Council, and underlines the need for such verification as a means of deterrence.

Together these topics create a rich canvas, but not the full picture. Among other issues are compliance monitoring and enforcement, the role of the United Nations, including the Security Council, the lessons of UNMOVIC and the expanding opportunities that new technologies and open sources can

offer to many States. These issues will be taken up by the Panel of Government Experts in 2006.

This paper was prepared in order to more widely disseminate the presentations made at the panel discussion on 20 October for the future experts on the governmental study and other interested individuals not able to be present for the occasion. We hope they are useful and serve their purpose.

* * *

INTRODUCTION

*Paul Meyer**

Canada has been a traditional champion of verification as an important component of multilateral non-proliferation, arms control and disarmament agreements. This interest in verification reflects recognition that the credibility and effectiveness of these agreements is a function of compliance by the State party to them and verification provides an objective basis for making compliance judgments. Canada played an active role in the development of the *Sixteen Principles of Verification* that were endorsed by the UN General Assembly in 1988 and which featured in a First Committee resolution that Canada presented regularly thereafter. Although this resolution enjoyed consensus support, we decided that, in light of international security developments, it would be preferable to initiate a new review of "verification in all its aspects" (as the resolution was entitled) rather than simply reaffirm the resolution for another year.

As a result, at the fifty-ninth session of the General Assembly in October 2004, Canada introduced a new resolution that called for the establishment in 2006 of a Panel of Government Experts to consider verification and the United Nations role therein. This initiative also reflected the fact that a decade had passed since the last UN Group of Government Experts had undertaken a study on this subject. Since that time,

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there had been several major political, diplomatic, security and technological developments that would have a bearing on verification and its relationship to the promotion of national and international security. The new resolution (59/60) was adopted without a vote and several countries responded during the course of 2005 to its invitation to submit national views to the Secretary-General on the issue.

As a further stimulus to fresh thinking about the topic of verification and related issues, Canada and the Department for Disarmament Affairs (DDA) collaborated on organizing a seminar on 20 October 2005 within the margins of the First Committee to draw attention to some salient issues regarding verification and to benefit from the views of experts from the International Atomic Energy Agency, United Nations Institute for Disarmament Research and the NGO community regarding them. The presentations at this seminar touched upon the wide spectrum of verification matters ranging from the nuclear realm and Non-Proliferation Treaty-related safeguards to the conventional field and the monitoring of arms embargoes. The questions addressed in the presentations and during the subsequent discussion revealed the many challenges and - most importantly- opportunities associated with the current verification of international security agreements. I believe they provide excellent input for the future deliberations of the UN Panel of Experts. Canada was very pleased to have been able to cooperate with DDA on this event and I commend the contents of this Occasional Paper to all those with an interest in the subject of verification and the potential role of the United Nations in this field.

* * *

Opening statement

*Nobuyasu Abe**

Abstract

Over the last fifteen years, the pendulum of verification has swung from earlier confidence in the effectiveness of international inspection under the multilateral treaties towards a marked scepticism and a resort to a greater degree of self-reliance by certain countries with sufficiently sophisticated technical capabilities. The author holds that the question of verification, especially of weapons of mass destruction, is too important to be the preserve of technical experts. Our task is therefore to find good ways for future verification requirements to be successful in securing compliance and averting catastrophic consequences.

Verification in the context of disarmament, arms control and non-proliferation agreements is, as the word implies, a process of ascertaining whether a State party is compliant with its commitments. From the early 1990s, the very use of the word "verification" has been a particularly prominent and politically charged issue for the whole international community. This was clearly evident after the discovery of serious breaches of non-proliferation obligations by States parties to the Nuclear Non-Proliferation Treaty. Nevertheless, for some of that time – in the early part of that decade – it was also synonymous with hope and a sense of progress.

* *Nobuyasu Abe* was Under-Secretary-General for Disarmament Affairs at the United Nations from July 2003 until January 2006.

At the time when serious doubts were cast about Iraqi compliance and the ability of the United Nations Special Commission (UNSCOM)[1] to secure it, I posed a question to Richard Butler, then Head of the Commission, whether an international verification system could truly secure compliance against a regime determined to delude it? He replied that first there had to be a political commitment and then a legal obligation. Verification confirmed that such a commitment was being observed. It was extremely difficult, he added, to secure compliance simply by verification without the legal and political commitment.

Verification is a tool to secure compliance and there can be as many versions of verification as there are disarmament, arms control and non-proliferation commitments. In effect, if there is a potentially serious consequence to the breach of a commitment – and if it is strongly suspected that such a breach has occurred – then verification has to become more stringent. In cases involving nuclear weapons, verification has to be even stricter, because even a discrepancy in quantities of material for even a few nuclear weapons can have catastrophic consequences.

The last fifteen years have offered many very different examples and types of verification measures. They have either been part of the process of actively seeking to disarm a known proliferator – essentially the UNSCOM and the UNMOVIC[2] experience – or alternatively, under the so-called permissive regimes, establishing whether States parties have been fully compliant with their treaty and other obligations – essentially the work carried out by the International Atomic Energy Agency (IAEA) and the Organisation for the Prohibition of Chemical Weapons (OPCW).

Of even greater importance perhaps over that same time span has been the shift from earlier confidence in the effectiveness of international inspection under the multi ater-

al treaties towards a marked scepticism and a resort to a greater degree of self-reliance by certain countries with sufficiently sophisticated technical capabilities.

There has been a shift from earlier confidence in the effectiveness of international inspection under the multilateral treaties towards a marked scepticism.

The hard fact must be faced that this trend has become more marked because of significant verification failures and because countries have increasingly sought to restrict investigative powers in existing treaties as well as in more recent international negotiations - most notably the failed verification protocol to the Biological Weapons Convention. More recently still, the nadir was perhaps reached with proposals put forward in 2004 for a fissile material cut-off treaty bereft of verification measures.

We have therefore reached a point where the 'pendulum of verification' has decidedly swung away from a commitment to openness and transparency towards a more grudging, and limited approach, hedged around by suspicion and mistrust.

The big question then is whether that pendulum will begin to swing back as some of the lessons of the last fifteen years are fully analyzed and absorbed? Alternatively, was the Chemical Weapons Convention the last hurrah for multilateral verification? A panel discussion such as this is therefore a very important part of the process of analyzing those developments.

Just as war is far too important a matter to be left to the generals, so the question of verification, especially in the field of weapons of mass destruction (WMD), is too important to be the preserve of technical experts. Our task is not to apportion blame for past failures, but to find good ways for future verification requirements to be successful in securing

compliance and averting catastrophic consequences.

The goal of an international system founded on mutual trust and confidence and a future free from the threat of conflict and of WMD use – whether by State or non-State actors – are issues that today concern us all directly.

Notes

[1] The United Nations Special Commission (UNSCOM) was created through the adoption of Security Council resolution 687 of 3 April 1991 to implement the non-nuclear provisions of that resolution and to assist the International Atomic Energy Agency (IAEA) in the nuclear areas. By its resolution 687, the United Nations Security Council established the terms and conditions for the formal cease-fire between Iraq and the coalition of Member States co-operating with Kuwait. Section C of this resolution called for the elimination, under international supervision, of Iraq's weapons of mass destruction and ballistic missiles with a range greater than 150 kilometres (km), together with related items and production facilities. It also called for measures to ensure that the acquisition and production of prohibited items were not resumed.

[2] The United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) was created through the adoption of Security Council resolution 1284 of 17 December 1999. UNMOVIC replaced the former UN Special Commission (UNSCOM) and continues with the mandate to verify Iraq's compliance with its obligation to be rid of its weapons of mass destruction (chemical, biological weapons and missiles with a range of more than 150 km), and to operate a system of ongoing monitoring and verification to ascertain that Iraq does not reacquire the same weapons prohibited to it by the Security Council.

* * *

THE IMPACT OF THE 1990 AND 1995 UNITED NATIONS VERIFICATION STUDIES ON TODAY'S POLITICAL ENVIRONMENT

*Patricia Lewis**

Abstract

The author provides a historical overview of United Nations verification efforts beginning with early General Assembly resolutions leading to the two governmental expert studies on the subject conducted in 1990 and 1995. She highlights the substantially different political perspectives brought to bear on the issue when each study was undertaken and how verification's evolving roles have met new challenges facing the Organization. She also notes the outstanding and recurrent themes in both reports, the impact of those studies on the current political environment, and suggests their influence on the concept of civil society verification today.

Historical overview

Discussions on verification began in the United Nations in 1959 emanating from General Assembly resolution 1378 which, for the first time, explicitly stated that "general and complete disarmament under

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effective international control" was the goal of United Nations disarmament efforts.

The importance of the control or verification of disarmament measures was further reiterated in the Joint Statement of Agreed Principles for Disarmament Negotiations, also known as the McCloy-Zorin Agreement,[1] by the Soviet Union and the United States on 20 September 1961. In addition to providing firm assurance of compliance under effective international controls, the Agreement also recommended the creation of an international disarmament organization within the framework of the United Nations to implement the proposed system of control. The verification organization would be composed of all parties to the agreement and its inspectors would have unrestricted access to all places, as necessary, for verification of disarmament measures.

In 1986, the Secretary-General submitted a report to the General Assembly containing views and suggestions from Member States on principles, procedures and techniques for promoting the inclusion of adequate verification in arms limitation and disarmament agreements and on the role of the United Nations in the field of verification.[2]

General Assembly resolution 42/42 F of 30 November 1987 was particularly significant in this context because it inscribed the item *Verification in all its aspects* in the provisional agenda of the Assembly's 43rd session. Crafted during the cold war, the text advanced the positions of Member States on the role of verification, especially in areas like openness and transparency, which were not accepted by all at the time.

Subsequently, in its 1988 substantive session, the Disarmament Commission reached agreement on a text containing a set of *Sixteen Principles of Verification*,[3] a section

on provisions and techniques of verification, and views on the role of the United Nations in that field.

Verification continued to gain momentum when two draft resolutions that dealt with the issue at the multilateral level were submitted to the General Assembly's 43rd session: the first, by Canada, France and the Netherlands; the second, by the Six-Nation Initiative comprising Argentina, Greece, India, Mexico, Sweden and the United Republic of Tanzania. Extensive negotiations between the sponsors of the two drafts led to a third draft resolution that reflected the willingness of the concerned parties to compromise on their differing approaches in order to garner the broadest possible support in the General Assembly. The resultant resolution 43/81 B, of 7 December 1988, requested the Secretary-General, with the assistance of a group of qualified governmental experts, to undertake an in-depth study on the role of the United Nations in the field of verification.

The role of the United Nations in the field of verification (1990 study)[4]

By its mandate, the 1990 expert group would identify and review the Organization's existing activities in the field of verification in all its aspects and assess the need for improvements, explore and identify possible future activities taking into account organizational, technical, operational, legal and financial aspects, and provide specific recommendations for the Organization's future action in that direction. The study took place when the Warsaw Pact was beginning to crumble, the Soviet Union was still in place, and the end of the cold war was near. Mindful of the times, it is instructive to note that the Permanent five (P-5) Security

The Permanent five Security Council members were among the 20 experts on the 1990 study.

Council members were among the 20 experts[5] on the study. Though the Group did not agree on everything, they made three recommendations on: 1) data and collection capability and the idea of a verification data bank of wide ranging scope; 2) exchanges between diplomats and experts; and 3) the role of the Secretary-General in fact-finding. The experts could not reach agreement, however, on the potential uses of UN aircraft and a UN satellite network for verification purposes. While both technologies were thought to be extremely useful verification tools, the experts could not decide on whether the United Nations or the Member States should have that capability. Since there was no definitive judgment on these two points, the Group concluded that the United Nations should continue to remain seized of these matters.

The Group also focused on the development of a UN verification system — an "umbrella" verification organization resulting from the coordination or merging of two or more verification systems. Indeed, there was a great deal of discussion in the two studies about the issue of synergy between the United Nations and Treaty agencies and whether they could perhaps do more together to reduce overheads, duplications and to promote learning mechanisms between them. While there was no real agreement on the development of such a system in the 1990 study, a compromise was reached calling for some kind of organic development, something that would evolve from the roots upward rather than a system that was imposed from above. Again, the Group felt that the Organization should keep this in mind and consider it over the years depending on how things evolved.

Verification in all its aspects, including the role of the United Nations in the field of verification (1995 study)[6]

The 1995 study built on and further developed the recommendations in the 1990 report, but with relevance for the post

cold war era. The former study was conceived in 1988 when the effects of the cold war were still very much in evidence. However, by the mid-1990s, conditions had changed dramatically and the United Nations was entrusted with a wider range of activities in the fields of disarmament, confidence-building and conflict management where verification could play a key role. This situational change was not only of a political nature, but new technologies were contributing to more effective means of verification as well.

By the end of the cold war, verification had a broader application for monitoring, openness, transparencies and data collection.

By the end of the cold war, there was a noticeable movement from the major arms limitation and disarmament treaties and state security issues to what today are called human security issues, conflict prevention and peacekeeping. There was a role for a different kind of verification — not technical or agency oriented — but verification with a broader application for monitoring, openness, transparencies, data collection and so on.

Preventive diplomacy, fact-finding, capacity-building for early warning and collection of information and analysis, peace and security operations, confirmation of cease fires, demilitarized zones, no fly zones and safe havens were among the new activities that came up in the 1995 report. Verifying the process of disarmament and demobilization verification came a little later. Verification to validate sanctions, to monitor elections, human rights and humanitarian relief followed.

Building on the *Sixteen Principles of Verification*, the 1995 Expert Group elaborated guidelines and principles for the UN involvement in verification. It sought to develop ideas which took into account the traditional arms limitation and disarmament context and the new contexts to which verification had relevance such as confidence-building and conflict

management. The ideas were arranged in two broad categories. The first category related to principles about the concept and general application of verification. These concepts included transparency, early warning, neutral "third party" verification, abuse of verification and measures to reduce abuse. The second category related to verification management. These concepts included matching verification means to verification ends, cost-effectiveness, synergies, that is, the multiplier effects of using several methods in combination to increase their individual as well as overall effectiveness, appropriate linkages and harmonization of verification efforts at the global, regional and subregional levels, safety issues, the spillover of verification technologies, additional applications of verification data, cooperative preparations, environmental protection and training. On the issue of managing verification, the Group recommended a careful look at areas like baseline data, cooperative data sharing, independence and impartiality, and verification and implementation mechanisms.

The 1995 Group of Experts examined the principles about the concept and general application of verification as well as verification management.

The Group also examined the Organization's future activities commensurate with its growing verification role. Particular attention was given to the ways in which a more robust verification capability could facilitate UN activities with respect to disarmament, confidence-building and conflict management processes. In relation to disarmament agreements, the Group identified the Organization's role in data analysis resulting from the collection of data associated with the Biological Weapons Convention, the potential of verification in the Convention on Certain Conventional Weapons, and confidence-building/verification measures in conflict-management situations.

When considering the role of the Conference on Disarmament, the Group suggested that the Conference look at the *Sixteen Principles of Verification*, build on them, perhaps even amend or change them in light of the current developments.

The 1995 Group of Experts made some valuable recommendations. One was the exchange of knowledge and expertise, particularly between the International Atomic Energy Agency, the Organisation for the Prohibition of Chemical Weapons and the United Nations Special Commission. It is important to note that this was 1995 — an era when the Comprehensive Nuclear-Test-Ban Treaty was being negotiated in Geneva and the outcome was not yet clear. This was also an era leading up to the extension of the Nuclear Non-Proliferation Treaty and when there were hopes for arms control and disarmament.

Another recommendation was the initiation, under the auspices of the Secretary-General, of a series of annual symposia in cooperation with regional or treaty-specific organizations. Indeed, regular meetings have been taking place and the recently adopted Security Council resolution 1631 (2005) on the cooperation between the United Nations and regional organizations in maintaining international peace and security has encouraged increased cooperation. This is definitely a feather in the cap of the United Nations in terms of implementation and communication channels with other bodies such as the North Atlantic Treaty Organization (NATO), the Organization for Security and Cooperation in Europe (OSCE) and the Organization of American States (OAS).

Other noteworthy recommendations in the study included encouragement of cooperative monitoring and verification experiments, UN studies on cooperative monitoring, the development of common services for other verification organizations particularly with sharing of databases, and a UN

information, training and analysis centre. It should be noted that training and information sharing was a recurrent theme throughout the elaboration of principles and guidelines.

A recurrent theme in both studies was the management of information related to peace and security - an outstanding and vital issue for the Organization when it comes to verification.

Coming to the United Nations role as a neutral "third party", the Group looked at the Organization's role in prevention and fact-finding and recommended the following courses of action: the United Nations should provide assistance, on request, through its regional centers, to parties negotiating and implementing verification regimes of arms control obligations and by developing reporting instruments, fact-finding and training activities; and it should also explore how to better prepare and systematize verification in its preventive diplomacy, peacemaking, peacekeeping and peace-building activities. But, these suggested courses of action have not happened. In terms of arms embargoes, sanctions monitoring has not taken off to a large degree. The expert study had also examined remote sensing aircraft and satellites as verification tools, but that too has not been implemented. Large differences remained in the way that the experts looked at things.

It is worthwhile to see which countries participated in the 1995 study compared with those in 1990. Three of the P-5 (France, the United Kingdom and the United States) were not on the 1995 study. Experts came from a different set of countries than those that had participated in the 1990 study.[7] It was 1995, the post-cold war era, with a different approach to verification in the context of the Organization's role in the new peace-building/peacekeeping environment and so a different set of countries with somewhat different interests participated.

Outstanding and recurrent themes

The verification aspect of biological weapons is another outstanding issue, as is missiles, the fact-finding role of the Secretary-General, the roster of verification experts, the United Nations Special Commission (UNSCOM) then and its successor, the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC). The issue of synergy building, how these treaty and implementation bodies communicate with each other and learn lessons from each other, was still inadequate and needed to be built on, according to the Group.

A recurrent theme in both studies was the management of information related to peace and security. This issue remains outstanding today and is vital for the Organization when it comes to verification. Yet, the Organization has not been able to properly deal with such tasks as handling, combining and making the most use of information.

There was a great deal of discussion in both studies about synergy and having agencies with common ground undertake common tasks and share learning mechanisms.

Impact of the two studies

The impact of these studies has been mixed. The first study put verification into perspective - understanding its limitations, that is, what it can and cannot do and that it is not a panacea for knowing everything. It is akin to intelligence gathering and shares some of its limitations. It is part of a process that involves many other facets which will be useful in determining facts. The view in 1990 was that verification was not something the United Nations, as a body, should perform in isolation, but it was something to which the Organization could make a vital contribution.

The contribution of the 1995 study was to add to our understanding of how verification concepts could be applied to peace-building, that is, how to build trust and confidence between warring factions and not just between States. The Organization was taking on this role and was even thinking about election monitoring in those terms.

The first study put verification into perspective, that is, understanding its limitations.

Today, however, our thinking has evolved. For example, the Ottawa Convention (the Mine-Ban Convention) has civil society monitoring it. If this idea of civil society monitoring had been put to the 1990 panel, the experts would have dismissed it as a nice idea, but no thanks. The concept of civil society verification was on the horizon then and the international community would not have known how to deal with this type of verification. That has been an important change, and I suggest that the 1990 and 1995 panels had a role in initiating and stimulating thought on this matter.

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Notes

[1] The text of the McCloy-Zorin Agreement is available at www.nuclearfiles.org.

[2] A/41/422 and Addenda 1 and 2, 11 July, 18 September and 14 October 1986, respectively. This and all further UN documentation is available at http://ods.un.org.

[3] See Annex, Disarmament Commission's Sixteen Principles of Verification, p. 75.

[4] A/45/372, 28 August 1990.

[5] The experts came from Argentina, Brazil, Canada, China, Czechoslovakia, France, the German Democratic Republic, Hungary, India, Japan, Kenya, Mexico, Netherlands, Nigeria,

Sweden, Union of Soviet Socialist Republics, United Kingdom, United States, Yugoslavia and Zaire.

[6] A/50/377, 22 September 1995.

[7] The experts came from Argentina, Austria, Canada, China, Egypt, Hungary, India, Kenya, Republic of Korea, Mexico, Netherlands, Nigeria, Russian Federation, Sweden, Sri Lanka and Venezuela.

* * *

RECENT DEVELOPMENTS IN THE FIELD OF NUCLEAR VERIFICATION

*Jan Lodding**

Abstract

Important technological innovations in the nuclear field have enabled the International Atomic Energy Agency to draw safeguards conclusions with a high degree of credibility and a minimum of intrusiveness. Yet, challenges remain in detecting nuclear activities involving non-nuclear material where the Agency's authority is limited. Bottlenecks with regard to isotope sample analysis and satellite imagery still need to be addressed. The author notes that the verification authority conferred upon the Agency through additional protocols to safeguards is central to its ability to optimize the use of cutting edge verification technology. Bringing into force comprehensive safeguards agreements with all NPT States parties and additional protocols with all States is therefore a major priority for strengthening the Agency's safeguards systems.

* *Jan Lodding* is Senior Policy Officer with the Verification and Security Policy Coordination Section, Office of External Relations and Policy Coordination of the IAEA. Prior to joining the Agency in 2001, he was responsible for nuclear weapons and missile policy at the Swedish Ministry of Foreign Affairs.

The effectiveness of a treaty verification system

A number of international agreements rely on verification regimes to ensure compliance with treaty provisions. The effectiveness of such verification systems

relies on a combination of access to information, locations and technology through which the available verification technology creates a unique set of circumstances depending on the type of material or activities to be verified.

Role of verification technology

A number of important technological innovations in the field of nuclear material verification have enabled the International Atomic Energy Agency (IAEA or the Agency) to strengthen its effectiveness while retaining a minimum of intrusiveness of the on-site inspection regime. Nonetheless, Member States remained reluctant to allow regular use of many new verification tools until a series of groundbreaking discoveries were made in the early 1990s.

The Democratic Peoples' Republic of Korea and Iraq are instructive cases that have shown how the optimum use of technology could strengthen the verification regime.

The Democratic Peoples' Republic of Korea (DPRK) and Iraq are instructive cases that have shown how the optimum use of technology could strengthen the verification regime. Would the right use of state-of-the-art verification technology have helped us discover the Iraqi nuclear weapons programme? The answer to that question is undoubtedly "yes". In particular, location-specific environmental sampling at the Tuwaitha site would have disclosed undeclared nuclear activities at an early stage. That same technology also helped us to discover inconsistencies in the DPRK's nuclear material declarations. Likewise, monitoring the dis-

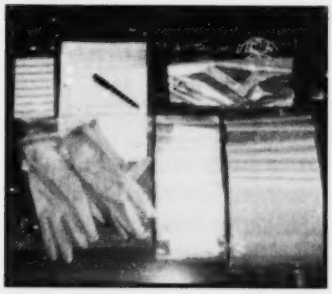
mantlement of South Africa's nuclear weapons programme gave us important insights into how a State might go about acquiring nuclear weapons covertly and in circumvention of international sanctions.

An IAEA operator analyzes a nuclear sample at the Seibersdorf laboratories near Vienna. Since its introduction as a routine safeguards measure in 1996, thousands of environmental samples have been analyzed, using a world-wide network of qualified laboratories, and the resulting data evaluated by the IAEA. The Agency aims to reduce the average time between environmental sample collection in the field and the reporting of analytical results.

Environmental sampling

Nuclear material verification has a great advantage in that each nuclear activity leaves a tell-tale fingerprint on the environment — a nuclear echo that can be picked up by taking environmental samples.

The Agency regularly takes such samples in the field, (the picture to the left shows an "environmental sampling kit"), and sends them to laboratories for detection of any traces of nuclear material. The Agency can then compare the results of those analyses with the type of isotopes that could be expected to be present at the location in accordance with the State's nuclear material declarations. Any discrepancy would give rise to a question or inconsistency which



An "environmental sampling kit" used by IAEA inspectors. Using a simple cotton swipe sample, the Agency is able to detect isotopic traces of any past activities involving nuclear material at a given location.

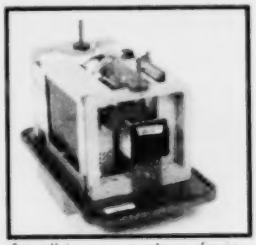
would then be discussed with the concerned State and additional samples would be taken if deemed necessary, until the Agency was satisfied that the question or inconsistency had been resolved.

Due to its usefulness for detecting undeclared nuclear material, environmental sampling has become a key tool of the additional protocol, i.e., for detecting undeclared nuclear material and activities.

Environmental sampling can be either location-specific or it can cover a wider area such as air or water samples. In 1995, the Agency's Board of Governors approved the use of location-specific environmental sampling, mainly for detecting diversion, pursuant to comprehensive safeguards agreements concluded in connection with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Due to its usefulness for detecting undeclared nuclear material and activities, the method has also become a key tool of the additional protocol (i.e., for detecting undeclared nuclear material and activities). Additional protocols require that States parties provide the Agency access to any location that it may specify for the purposes of, *inter alia*, collecting environmental samples. However, if the State party is unable to provide such access, it must make every reasonable effort to satisfy Agency requirements, without delay, at adjacent locations or through other means.

With regard to Wide Area Environmental Sampling (WAES), the Board has not yet authorized the use of this technique for safeguards implementation. However, the additional protocols provide that once the Board has authorized such use, States parties, following consultations with the Agency, shall provide access for WAES at the Agency's request. So far, the Secretariat has not requested the Board to authorize its expanded use in the field.

Environmental samples are analyzed by two or more laboratories in the Agency's network of laboratories qualified for environmental sample analysis. Currently, sixteen laboratories in eight countries, including the Agency's own laboratories at Seibersdorf near Vienna, analyze such samples. Samples are coded with a number, the identity of which is known only to a very limited number of Agency staff. Replicate samples taken in the field to minimize cross contamination at Seibersdorf are sent to multiple laboratories for analysis to guarantee the validity of the results. The limited number of qualified laboratories and Member States involved in the network presents a special challenge for the Agency. The numbers of samples far exceed the existing capacity of the existing network resulting in an average lag time of several months. Moreover, the Agency would like to see further qualified laboratories in more States represented in its network of safeguards analytical laboratories. It would also welcome an expansion in the sample analysis capabilities of its own laboratories.



An all-in-one system device for containment and surveillance records transmits images to the Agency from easy to access locations in nuclear facilities. The strategic application of such digital image surveillence systems, using reliable virtual private networks and broadband Internet, may sometimes create efficiencies in the implementation of safeguards.

Containment and surveillance

Containment and surveillance (C&S) at nuclear facilities have always been a central component of the Agency's safeguards system. Over the past years, C&S technologies have developed exponentially. The Agency uses electronic seals routinely and is able to oversee facilities around the world in real

A hand-held radiation monitoring device. This monitor is a standard tool for spotting radiation. In the verification area, it may be used to confirm the presence of declared nuclear material or to detect any undeclared nuclear activities.

time through the digital transmission of images and other data in direct online connection to Vienna. Initial difficulties with installing equipment in high radiation environments have been overcome to allow for safe and effective use of cameras at some of the most sensitive nuclear facilities. An important priority is for States to agree to the transmission of sensitive data from facilities.

On-site inspection tools

Some of the technologies that have become available to a mass audience over the past years, such as digital cameras and global positioning systems (GPS), contribute to the effective implementation of on-site inspections. More specialized verification technology is continuously becoming available to inspectors through innovations. This development is supported through the Member State Support Programmes whereby nineteen Member States (Brazil and South Africa are the most recent additions) offer cost-free technical expertise to develop new verification technologies and effective and efficient safeguards approaches. One outcome of these Programmes is the digitalized Cherenkov Device developed by Canada and Sweden for the Department of Safeguards. Such a device can detect radiation in water and thus confirm the presence of pins in fuel elements inside fuel ponds.

Satellite imagery

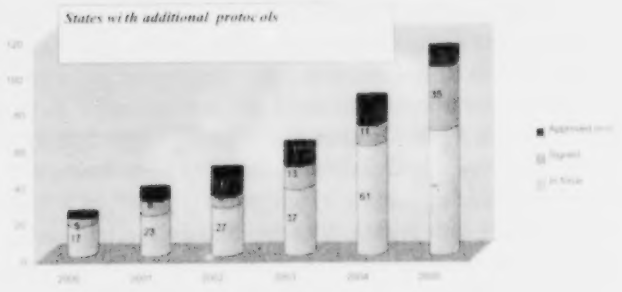
For a long time, the discussion of verification in all its aspects featured a debate as to whether the United Nations should

acquire its own satellite capabilities in order to even out the playing field with those States that have access to their own advanced national technical means. Over the years, however, high quality images have become less and less expensive and less and less difficult to come by. The Agency now routinely buys images from commercial satellite operators. In its evaluations, the Agency makes use of such images that are available from open sources and voluntarily from States and is in the process of upgrading its analytical capabilities in this area. A problem with regard to commercially available images is the sometimes long wait between the request for an image and its actual delivery. This is due, in part, to the high cost of priority tasking.

Challenges to the verification system

Recent cases show that States may go to great lengths in trying to avoid detection of their undeclared nuclear-related activities. This has highlighted the Agency's limited authority with regard to nuclear activities not involving nuclear material. For instance, in order for the IAEA to provide "early warning" of clandestine attempts by States to develop their domestic capability to produce nuclear material, the Agency would need to receive information on the flows of non-nuclear technology relevant to its verification task. The Agency's need to receive such information was acknowledged when the Model Additional Protocol was devel-

Inspectors employ a digitalized Cherenkov device at a nuclear fuel pond. A number of Member States conduct programmes to support the development of verification technology for use by IAEA inspectors. This piece of equipment was developed in order to help inspectors confirm that nuclear material is not diverted for the purpose of plutonium reprocessing.



oped in the late 1990s in the light of the Iraq experience. That Protocol has two annexes containing (1) items for which a State is to report the domestic capabilities of certain activities, and (2) specified equipment and non-nuclear material for which a State is to report exports and, if the Agency requests, imports. The Board may amend these annexes upon the recommendation of an open-ended working group to include other indicators that may be considered relevant from the point of view of tracking possible nuclear acquisition efforts. The Agency also receives information beyond these items voluntarily from Member States. This might be an area worth revisiting in the coming years.

The verification authority conferred upon the Agency through additional protocols to safeguards agreements on the basis of the 1997 Model Additional Protocol — and in particular, the additional access rights — is central to its ability to optimize the use of cutting edge verification technology. In the Director General's words, in order to provide the required assurance, the Agency needs to be given the necessary author-

ity. It is an important priority of the international community to expand adherence to the Agency's strengthened safeguards system through the conclusion and implementation of NPT safeguards agreements and additional protocols. Such calls have recently been made by the Secretary-General and his High Level Panel on Threats, Challenges and Change. That aside, more than half of the UN Member States have yet to bring into force additional protocols, and 36 NPT States still do not have any safeguards agreements in force for verification of their NPT undertakings. The rate of conclusion of NPT safeguards agreements and additional protocols has picked up considerably since the Agency and its Member States launched an outreach effort a few years ago. In 68 States, where the Agency is currently implementing comprehensive safeguards with additional protocols, its capabilities are being strengthened to such a degree that we have the information, access and tools available to draw safeguards conclusions even with regard to the absence of undeclared nuclear material and activities in the State as a whole. We hope to see that number increasing steadily over the coming years.

It is an important priority of the international community to expand adherence to the Agency's strengthened safeguards system through the conclusion and implementation of NPT safeguards agreements and additional protocols.

Summary

Besides access to relevant information and locations in the field, verification technology plays a major part in ensuring the effectiveness and efficiency of the Agency's safeguards system. In the nuclear field there are a number of powerful verification techniques that enables the Agency to draw safeguards conclusions with a high degree of credibility and a

minimum of intrusiveness. Environmental sampling is of special relevance in this regard, though the Agency would like to expand its network of laboratories and in-house analytical services. Bringing into force NPT safeguards agreements with all States parties and additional protocols with all States is a major priority in order to strengthen the Agency's safeguards systems. Challenges still remain, particularly with regard to the verification of nuclear activities not involving nuclear material.

* * *

EVOLUTION IN VERIFICATION TECHNOLOGIES

*Angela Woodward**

Abstract

The evolution in verification technologies has three phases: the driving factors; the advances; and the impact of those advances on current and future verification systems. The author notes the role of multilateral organizations in the verification process and highlights civil society's increasing role in the development and application of new technologies for informal treaty monitoring and verification activities. Concern is expressed over the intrusiveness of enhanced verification technologies and what factors will drive their future development. The verification lacuna in the biological weapons field, despite UNMOVIC's development of an integrated data management system, leads to an appeal for further verification technologies for those weapons and effective verification mechanisms for the Biological and Toxin Weapons Convention.

The last fifty years have witnessed exponential growth in the sophistication of technologies around the same time that major arms control and disarmament treaties were agreed. Many of these technologies have been

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applied to weapons development, most notably the so-called weapons of mass destruction (WMD).[1] But also, this technological innovation has been a boon for verification efforts, that is, verifying States' compliance with their obligations to prohibit or control the development, proliferation and/or use of WMD and other conventional weapon systems.

It is perhaps ironic then, that many of these new verification technologies were not specifically developed with a verification objective in mind. Rather, their verification capabilities were largely identified later on. Whatever the genesis, however, each new technology when applied to monitoring and verifying States' compliance with arms control and disarmament agreements has enhanced the effectiveness and efficiency of the verification system to which that technology is a part.

. . . each new technology has enhanced the effectiveness and efficiency of the verification system to which it is a part.

The availability of improved technologies has influenced the refinement of existing regimes and the development of new verification systems. Increasingly, these technologies are also being used under compliance arrangements to assess serious allegations of non-compliance with arms control and disarmament obligations arising from treaties and/or UN Security Council resolutions.

The three-part presentation that follows traces the evolution of verification technologies by: 1) outlining certain factors that have driven their development; 2) providing examples of technological advances in three phases of verification; namely, data collation and collection, data transmission, and data processing and evaluation, and iii) discussing some of the impacts of these technological developments on the design and implementation of current and possible future verification systems.

Drivers of verification technologies

States parties

The *increasing sophistication of States parties' obligations* arising from arms control and disarmament treaties and other agreements, including Security Council resolutions, necessitates the continuous development and refinement of technologies as well as techniques for verifying compliance.

Breaches of the earlier arms control treaties, which banned the use of specific weapons, were largely identifiable by examining battlefield casualties and fatalities. Examples include the 1899 Hague Declaration and the 1925 Geneva Protocol banning the use of expanding bullets and chemical and biological weapons, respectively. It is far more complicated to verify more recent agreements which ban the development of specific weapons, especially where these weapons are manufactured using dual-use materials, equipment and techniques. For instance, efforts to monitor the non-diversion of uranium and plutonium from civilian nuclear energy programmes to nuclear weapons necessarily involve meticulous accounting of fissile material.

It is far more complicated to verify more recent agreements which ban the development of specific weapons, especially where these weapons are manufactured using dual-use materials, equipment and techniques.

Likewise, verification systems must be sufficiently flexible to keep up with attempts by States and non-State actors to circumvent treaty restrictions and evade verification efforts. This flexibility involves not just further development of verification technologies, but also reconfiguration of the various available verification techniques. For example, today verification authorities are, to the extent allowed under their respective mandates, using or exploring satellite surveillance

to a greater degree. Remote monitoring may provide unique verification opportunities, but it has its drawbacks. Attempts to hide illicit activity by ceasing operations during a satellite overpass would need to be detected through alternative verification techniques, such as extended use of open source data or through a wider interface between human intelligence and the verifying authority.

Synergy between the increasing availability of verification technologies and agreement on more sophisticated treaties continues under the treaty regimes. The *multilateral organizations* established to implement treaty verification systems routinely consider the state-of-the-art verification technologies in their field when mandates permit. They do this not only to improve the effectiveness of the verification methods necessary to fulfill their mandates, but also to reduce the costs of verification (with respect to financial, human and capital resources) and to further increase confidence in compliance with these agreements. For example, the International Atomic Energy Agency (IAEA)[2] and the UN Monitoring, Verification and Inspection Commission (UNMOVIC)[3] strive to develop new standards for both effectiveness and cost efficiency for verification technologies under their respective mandates.

The IAEA supplemented its 1970s system of paper-based materials accountancy, on-site inspection and shelf counting techniques with live monitoring involving Closed Circuit Television (CCTV) in the 1980s. CCTV is only one of several remote monitoring technologies which the Agency constantly assesses. The concept of live remote monitoring has inspired other verification regimes. For instance, it can be said that the concept had inspired the drafters of the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT) when the International Monitoring System (IMS) was considered. The concept is also inspiring the Organisation for the Prohibition

of Chemical Weapons (OPCW)[4] as it develops the monitoring system mandated by the 1993 Chemical Weapons Convention (CWC).[5]

As previously mentioned, *States* have also played an important role in developing, enhancing and refining verification technologies. While some of these technologies have been developed with verification applications in mind, the majority were developed for other military or civilian purposes and applied simultaneously or subsequently for verification purposes.

States' national capabilities, including national technical means (NTM), are being used to assess State party compliance with obligations and other activities which could have an impact on State security. While national intelligence gathering does not always relate to verifying States parties' compliance, many of these technologies are capable of being used for this purpose.

States with developed NTM capabilities are liaising with multilateral verification organizations over both the provision of data derived from NTM to be applied to arms control and disarmament verification (for obligations under treaties and UN Security Council resolutions) and to assist these organizations in developing new, mandate-relevant verification technologies.

Often these technologies are later made available for peaceful applications through the commercial sector, but certain characteristics may first be degraded to prevent them from providing a military, commercial or other advantage. The development of Global Positioning System (GPS) technologies by the United States' military, subsequently passed on to the commercial sector at a lower resolution, is an example. Commercially available off-the-shelf technologies can thereafter be used in international verification. Sometimes, however, new technologies are viewed with suspicion, such as

the proposed use of the GPS in any future CTBT on-site inspections, despite the efficacy of using this system over outdated techniques, such as a map and compass.

As arms control and disarmament agreements relating to so-called WMD involve controls on dual-use materials, equipment and technologies, international verification activities are being applied to non-State sectors of society. Research and development in the academic and industry sectors, in particular, are involved in international verification systems. Examples include IAEA inspections of nuclear research reactors operated by academic institutions and OPCW inspections of chemical industry facilities. This has also spurred the development or refinement of specific managed access techniques to be applied to protect academic and commercial proprietary information.

Civil society

Sectors of civil society have also played an innovative role in arms control and disarmament treaty verification. Civil society actors traditionally engaged in verification activities include those with expertise in natural and social sciences, international law, international relations and security studies drawn from academia, non-governmental organizations or grass roots advocacy organizations.

While not a part of formal verification systems, civil society is playing an increasing role in informal treaty monitoring and verification activities. Its role has been aided by the ever-increasing availability of compliance-related information through open sources and the democratization of technologies for collating, analyzing and assessing this information.

Precisely because civil society is not a part of formal treaty monitoring, it is not subject to mandates on the types or scope of information it may collect. For example, civil socie-

ty members may collect many discrete pieces of information and combine and analyze them in ways that may not be available to formal monitoring and verification systems. This type of analysis has been particularly useful in detecting information which does not fit a compliance model, that is, in detecting elements of a 'non-compliance footprint'.

In the past decade, civil society has been able to collate information from previously unavailable open sources, using the Internet and databases, such as planning applications and patent records. It may also make use of certain previously restricted sources, such as government records made available under freedom of information legislation. Civil society has also been able to source information from the commercial sector, such as satellite imagery or online environmental monitoring, including that provided by the Incorporated Research Institutions for Seismology (IRIS).[5]

While not part of formal verification systems, civil society is playing an increasing role in informal treaty monitoring and verification activities.

Civil society has further benefited from new techniques and technologies to analyze this swathe of information and, in certain cases, has been at the forefront in designing these technologies for treaty verification purposes. Even after computers became widely used for academic research, information continued to be catalogued in card indexes until the early 1990s. Now, researchers have harnessed the digital age and developed data-mining techniques to sift through vast, disparate pieces of information. One such technique was designed precisely to detect elements of a non-compliance footprint which might not have been discernible through standard assessment techniques. Researchers at the New Mexico Institute of Mining and Technologies in Socorro, New Mexico, USA have devised a data-mining technique using open source information that can assist in the detection

of clandestine chemical or biological weapons research. Their technique assesses information such as records of scientific research partnerships, scientific publications and company web sites to reveal connections that would be expected if legitimate research were being conducted and those that indicate possible covert and illegitimate research. Deep-web search engines are constantly developed to improve the accuracy of searching the estimated 80 per cent of the World Wide Web that is not covered by web-spider based engines such as *Google*.

Using these new technologies, civil society monitoring has significantly increased trans - parency with regard to the implementa - tion of specific treaties.

Using these new technologies, civil society monitoring has significantly increased transparency with regard to the implementation of specific treaties. For example, the ground-breaking Landmine Monitor[7] initiative of the International Campaign to Ban Landmines (ICBL) produced an annual report on States parties' adherence to the 1997 Ottawa Convention on anti-personnel landmines since its entry into force. In fact, Landmine Monitor has taken on a semi-official verification function for the treaty, in the absence of a treaty-mandated verification regime. More recently, the BioWeapons Prevention Project (BWPP) launched the BioWeapons Monitor[8] online database in 2004 to increase transparency over compliance with the 1972 Biological and Toxin Weapons Convention (BTWC),[9] precisely because of States parties' failure to agree on means to verify compliance with that Treaty.

As more technologies that are relevant to treaty monitoring and verification become publicly available and as the costs of such technologies reduce over time, it can be expected that members of civil society will become increasingly

involved in the development or application of new technologies for verification purposes.

Advances in verification technologies

Data collection and collation

In this phase of the verification process, compliance-relevant information is gathered together and sorted for use in the next phase — data transmission. Data collection and collation may be carried out simultaneously by the State and the verification system, and each may be responsible for collecting different types of data. In arms control and disarmament agreements, States parties are usually required to collect information on national compliance for submission to a verifying body.

Methods for collating and assembling compliance-related information have greatly improved. While certain arms control and verification systems have adapted to these developments, certain monitoring systems have conspicuously failed to adapt, largely for political reasons, and continue to lag behind their counterparts. As the methods used for data collection have an impact on the effectiveness of each successive phase of the verification process, it is crucial that these methods be as efficient as possible.

Technological advances have occurred in a range of data collection and collation techniques. *States' compliance declarations* can now be prepared in electronic formats and submitted online. The concept of *remote monitoring* has been made a reality through these advances. The verification capabilities of satellite observation, aerial over-flight and improved data capture technologies, such as cameras and detection stations are also being continuously refined.

Satellites have been used for verification activities since their inception, at least for NTM purposes. The resolution of military satellite imagery has improved from an 8-13

meter resolution in the late 1950s, to approximately 15 centimeters in the 1970s and undoubtedly a vastly superior quality today (US Key Hole satellites). While routinely lagging behind the quality of military imagery, commercially available satellite imagery is of sufficient quality for arms control verification and is increasingly being applied for this purpose by multilateral verification organizations and, as mentioned above, civil society monitoring.

Advances in data capture technologies have increased the range of available verification techniques, improved the accuracy of data recording and reduced verification costs in terms of personnel and on-site verification activities. For example, the International Monitoring System of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)[10] implements a configuration of waveform (recording seismic, infrasound or hydroacoustic waves) and radionuclide (capturing radionuclides carried by the winds) monitoring stations providing a more advanced capacity for detecting nuclear explosions than the earlier seismic network established by the United States. The IAEA has also harnessed technological advances for remote monitoring to improve its detection capabilities and to reduce verification costs.

Little known in the early 1990s, the Internet has greatly facilitated the collation of information for arms control and disarmament treaty verification in the past 15 years.

On-site inspection activities have been enhanced through improvements in observation, sampling and recording technologies. While no equipment can replicate the sophistication of human observation (the Mark I eyeball), developments in electronic sampling equipment such as portable chemical warfare agent detectors combined with more efficient data logging systems have advanced the capabilities of the verification enterprise.

Certain States continue to drive the development and refinement of verification technologies through their *national technical means* of verification. In certain cases, these technologies are shared with multilateral verification organizations like the IAEA. As these technologies become publicly available, they also facilitate improved civil society monitoring.

Perhaps above all, the availability and quality of information through *open sources* has benefited from technological advances. Little known in the early 1990s, the Internet has greatly facilitated the collation of information for arms control and disarmament treaty verification in the past 15 years. It is used by multilateral verification organizations, States and civil society alike, significantly 'democratizing' verification in the process. However, the value of open source information should not be overemphasized, as such information can be inaccurate, incomplete or biased.

Data transmission

The advances in *communications technologies* have also been positive spin-offs for the transmission of compliance information between those carrying out collection, collation, processing and evaluation activities. Many States have relegated 1970s state-of-the-art dial-up systems reliant on copper cables to historical archives and are using fiber optic cable and wireless technologies. In the early 1990s, 9.6 to 14.4 kilobytes per second modems were considered high technologies. Today, that transmission capability is standard in GSM mobile telephones. Even Ethernet technologies, which drive most computer networks today, carry a signal at 10 megabytes per second. Yet, this capacity is dwarfed by the capabilities of the Internet backbone (Optical Carrier Level OC-768), which transmits data at a staggering 40 gigabytes per second. Satellites are also being used for data transmission, in addition

to their data collection role, with delays between transmission and reception now down to approximately 250 milliseconds. However, the bandwidth for data transmission may be shared with other users and user data may be beamed to earth in a wide broadcast, making it susceptible to eavesdropping.

The Global Communications Infrastructure of the Comprehensive Nuclear-Test-Ban Treaty Organization ... links three communications satellites ... to submit around 50 gigabytes of data daily. Given the low bandwidth requirements of this data, this is an impressively large amount.

The adoption of the CTBT and development of its monitoring system, overseen by the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (Prep Com for the CTBTO), fortuitously coincided with improvements in these technologies. The Global Communications Infrastructure of the CTBTO, which links the 321 monitoring stations and 16 radionuclide laboratories to the International Data Centre in Vienna, uses three communications satellites (supplemented by two satellites for data transmission over Europe and North America) to transmit around 50 gigabytes of data daily. Given the low bandwidth requirements of this data, this is an impressively large amount.

The *Internet* is increasingly being used as an inexpensive and reliable data transmission route for compliance information. Concerns about data security are being addressed by improvements in *encryption* technologies which, while not unbreakable, serve to make the information largely redundant by the time encryption codes can be unlocked. The *Global Positioning System* can be connected to a laptop computer, along with electronic sampling equipment and a satellite phone, to transmit the time and location of sampling activity, and even the composition of the sample, in near real time, to

a verifying authority.

Data processing and evaluation

Data processing can assist in the categorization of data for use in compliance assessment evaluations. Advances in verification technologies for data collection, collation and transmission, combined with advances in computer processing power, have created a distinct potential for more effective data processing. However, human intervention remains an important factor in this phase of the verification process which technological advances cannot override, for example, the setting of parameters for data evaluation.

Data processing has benefited from advances in computing power and the sophistication of computer applications, particularly those supporting integrated data management. It is difficult to comprehend just how quickly *computer processing* technologies are progressing. As an example, a computer games console being released in 2006 (the Sony PlayStation 3) has more computing power than the 1995 Intel ASCI Red computer, which was the fastest computer available only ten years ago. Today, hand held computers pack 200 times more memory capacity than the computer that guided Apollo 11 to the moon.

New *computer applications* are being devised to handle verification data processing. Algorithms are used to analyze seismic data to detect nuclear explosions, while data-mining programmes are used to evaluate discrete information from various sources. Verification data processing has also benefited from the development of *information management systems*. A recent example is the integrated data management system developed by UNMOVIC to handle the range of information that it and its predecessor, UNSCOM, (the UN Special Commission), had collected. This system manages such disparate information as State declarations, maps, satellite

imagery, on-site inspection reports and sampling reports and provides intranet, archival and search engine facilities. These technologies were simply not available ten years ago when UNSCOM was searching for appropriate data management techniques.

The integrated data management system developed by UNMOVIC manages such disparate information as State declarations, maps, satellite imagery, on-site inspection reports and sampling reports and provides Intranet, archival and search engine facilities.

Impact of technological advances in verification

The evolution of verification technologies and their application in various combinations to verify compliance with arms control and disarmament obligations will naturally have an impact on the design and implementation of existing and future verification systems.

Flexibility

Verification systems need to be sufficiently flexible to be able to utilize new technologies that enable them to better fulfill their mandate. The globalized economy is making the materials and means for weapons development more available to both State and non-State actors. Consequently, the verification systems charged with deterring and detecting violations of agreements banning these weapons must be afforded the requisite resources to fulfill their tasks. This includes assessing the state of current technologies relevant to their verification mandate, identifying gaps, and procuring appropriate new techniques and technologies, possibly in conjunction with States and commercial companies. Likewise, verification technologies need to be constantly refined and developed to

keep up with advances in weapons technologies.

Allaying concerns about the misuse of verification technologies

The continuing evolution in verification technologies inevitably leads to concerns about their use, specifically the use of enhanced verification technologies that are capable of being used more intrusively. Concerns such as finding a balance between transparency and confidentiality; demonstrating compliance while managing access; and agreeing on acceptable levels of intrusiveness are regularly considered and addressed by the multilateral verification organizations in the arms control and disarmament field. Whether verification arrangements established on an ad hoc basis can consider and adequately respond to these concerns depends largely on their mandate and resources. For example, UNSCOM was not required to institute effective confidentiality measures relating to the information it had collected, while UNMOVIC developed an effective system to safeguard the use of its information.

Access to verification technologies

Many capabilities are now available online. A continuation of this trend can enhance the technological capabilities of both developing States without sophisticated national technical means and of civil society for verification and other purposes. For example, the IRIS network has more seismic stations online than the IMS of the Prep Com for the CTBTO.

Even the non-governmental organization, Verification Research, Training and Information Centre (VERTIC),[12] had a rudimentary system for detecting nuclear explosions in the early 1990s, using a dial-up system to download seismic data from university databases to a VERTIC database which used

algorithms to detect unnatural activity indicative of an underground nuclear explosion. Any such detection set off a beeper calling VERTIC staff back to the office to check the data. The IRIS system now provides this seismic data online.

Future requirements

Discussions on proposed control regimes for weapons systems, their constituent elements and delivery systems often fail to lead to negotiations, at least in part, due to perceptions that these agreements cannot be effectively verified or, conversely, to concerns that illicit or sensitive activity may be uncovered through verification. Impartial assessments of the verification requirements for such agreements would facilitate a more considered discussion. This should include surveys which identify the applicability and possible modifications of existing technologies and the scope of new technologies that may be required.

No new multilateral verification systems for arms control and disarmament that would significantly drive the development of appropriate technologies are foreseeable in the near future.

Of more concern, perhaps, is the question *what will drive the development of future verification technologies?* States will continue to develop new verification technologies for use under their national technical means of verification. Unfortunately, no new multilateral verification systems for arms control and disarmament that would significantly drive the development of appropriate technologies are foreseeable in the near future. The IAEA, the Prep Com for the CTBTO and the OPCW will therefore continue to play an important role in developing verification technologies appropriate to their mandates.

To some degree, verification mandates can serve to

constrict the application of effective verification technologies. This problem relates more to the lack of political will of States parties collectively to redress any shortcomings in the verification mandate rather than an unavailability of effective verification technologies.

The glaring anomaly of the verification lacuna in the biological weapons field remains.

The glaring anomaly of the verification lacuna in the biological weapons (BW) field remains. Discussions under the Group of Governmental Experts on verification of the Biological and Toxin Weapons Convention (VEREX) from 1992-1993, the 1994 Special Conference, the Ad Hoc Group negotiations on a verification protocol from 1995-2001 and the establishment of UNSCOM and then UNMOVIC necessitated critical assessments of BW verification techniques and technologies. In particular, UNMOVIC coordinated a systematic collation of BW verification technologies, including the development of new equipment necessary to complete its mandate. The continued absence of a verification system, or even an effective compliance mechanism, for the BTWC can no longer legitimately be attributed to a lack of effective BW verification technologies. Lest this momentum be lost, it would be prudent to consider means for further driving the development of BW verification technologies and to reconsider means to effectively verify compliance with the BTWC.

In conclusion, this overview merely skims the surface of the evolution of verification technologies. The means to verify compliance with arms control and disarmament obligations is evolving as quickly as science itself. The twentieth century was a decade of great scientific innovation. The pace of innovation, driven on by humankind's thirst for knowledge, shows no signs of slowing down. This, of course, is a source of great optimism.

Notes

[1] Weapons of mass destruction are often defined as nuclear, biological and chemical weapons.

[2] See the web site of the International Atomic Energy Agency (http://www.iaea.org).

[3] Mandate of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC), op cit., p. xvi. For additional information see the Commission's web site (http://www.unmovic.org).

[4] See the web site of the Organisation for the Prohibition of Chemical Weapons (http://www.opcw.org).

[5] The Chemical Weapons Convention is more commonly referred to by its date of opening for signature (1993) than its date of adoption (1992).

[6] See the web site of the Incorporated Research Institutions for Seismology (http://www.iris.edu).

[7] The Landmine Monitor is available at (http://www.icbl.org/lm).

[8] The BioWeapons Monitor is available at (http://www.bwpp.org/bwm).

[9] See the web site of the Biological and Toxin Weapons Convention (http://www.opbw.org).

[10] See the web site of the Comprehensive Nuclear-Test-Ban Treaty Organization (http://www.ctbto.org).

[11] Mandate of the United Nations Special Commission (UNSCOM), op cit., p. xvii. For additional information see the Commission's web site (http://www.un.org/Depts/unscom).

[12] See the web site of the Verification Research, Training and Information Centre (http://www.vertic.org).

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STRENGTHENING COMPLIANCE WITH UN ARMS EMBARGOES – KEY CHALLENGES FOR MONITORING AND VERIFICATION

*Brian Wood**

Abstract

The authority of the United Nations is greatly undermined by persistent violations of Security Council arms embargoes. Objective verification of such violations is necessary to ensure compliance with UN arms embargoes, but experience has shown that successful verification requires a number of specific measures. The Security Council should continue to improve the design of arms embargoes, but address the issue of impunity of embargo violators. Member States should provide a more effective framework of national controls based on a common set of criteria for international arms transfers agreed by the General Assembly fully consistent with international law. UN Sanctions Committees, the Secretariat and investigative teams require better support to improve verification methods, techniques and procedures, especially from Member States close to the embargoed entity, UN peacekeeping missions operating in the vicinity and other relevant intergovernmental organizations.

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States have a legal obligation to comply strictly with arms embargoes imposed by the Security Council under the authority of Chapter VII of the UN Charter. Rigorous design, monitoring and compliance with the agreed terms of such embargoes can contribute significantly to the promotion of international peace and security, and to the respect of a wide range of human rights and fundamental freedoms as required in international law. The authority of the Security Council and the United Nations is greatly undermined by persistent violations of UN embargoes and impunity of the violators.

Verification arrangements for UN arms embargoes must therefore be capable of providing, in a timely fashion, clear and convincing evidence of compliance or non-compliance. Continued confirmation of compliance is an essential ingredient to building and maintaining confidence among the parties. However, it is clear that some fundamental elements of the international mechanisms for accurate and timely verification are missing or not adequately functioning.

It has become more common practice for the Security Council to impose arms embargoes on parties (State and non-State) to a conflict as a response to the existence or impending threat of violent conflict.[1]

There are currently mandatory territorial arms embargoes in force against the Ivory Coast,[2] Liberia[3] and Somalia.[4] Non-State actors are also subject to arms embargoes. Currently, every State in the international community is prohibited from transferring arms to groups in the Democratic Republic of Congo (DRC),[5] Liberia,[6] Rwanda,[7] Sierra Leone[8] and in Sudan,[9] as well as to Al-Qaida and associated persons.[10]

Verification of illicit traffic in arms in violation of UN Security Council arms embargoes thus deserves substantive consideration. It should take into account the inherently clan-

destine nature of such traffic and its grave consequences. In particular, the proliferation and misuse of small arms and light weapons in conflicts and persistent acts of state repression involving serious human rights violations, war crimes and crimes against humanity pose major challenges for such verification for reasons that are set out below.

Lack of UN standards to help ensure reliable State monitoring

All UN arms embargoes should be mandatory on Member States – the notion of a non-mandatory embargo is a recipe to allow embargoed entities to make arrangements to flout the will of the United Nations.[11] Under Article 41 of the UN Charter, States have a legal obligation to abide by embargoes enacted by the Security Council and a duty to implement measures to ensure that persons within their jurisdiction also comply with the embargoes.[12] However, it is reported that many States have not made the violation of a UN arms embargo a criminal offence under their domestic law.

. . . the notion of a non-mandatory embargo is a recipe to allow embargoed entities to make arrangements to flout the will of the United Nations.

Moreover, the challenges of verifying embargo compliance are compounded when States, especially traditional suppliers and adjacent States, do not have an adequate system of national laws and/or regulations and administrative procedures to exercise effective control over armaments and the export and import of arms in order to prevent illicit arms trafficking. This is particularly important because the UN Sanctions Committees themselves have no operational verification mechanisms. They have to rely on the efforts of individual Member States, acting singly or with others. Such cooperation can take several forms: unilateral, multilateral or

the utilization of regional organizations – and it is reliant on political good will and commitment to upholding international norms. The scope and effectiveness of such national laws and regulations is an indicator of such commitment and these should be broad enough to cover all types of arms, especially small arms which often circulate in civil society and are easy to conceal, and to control all actors involved in arms production, assembly, stockpiles, transfers, brokering, financing and use. Unfortunately, this is far from the case and national controls, even in States with great resources.[13]

The design of effective legal and regulatory standards and systems to prevent the wider illegal traffic in arms is essential to prevent the violation of UN arms embargoes. The wider problem of illegal arms trafficking is closely related to the illegal possession, transfer and misuse of arms by non-State actors, especially criminal groups, and often fuelled by the misuse of arms by State actors. Arms embargoes are imposed in order to address threats to peace and worsening humanitarian crises that in many cases are already being fuelled by such illegal acts. Embargoes are therefore late and often blunt instruments and therefore cannot be deployed effectively as an instrument by the United Nations to prevent illicit arms trafficking without better national controls.

The design of effective legal and regulatory standards and systems to prevent the wider illegal traffic in arms is essential to prevent the violation of UN arms embargoes.

Monitoring and compliance with UN arms embargoes would greatly improve if national arms control systems were more consistent with existing international law. States would develop greater trust in supplying information to the United Nations about diverted arms if they had more common rules based on shared values. According to the United Nations Disarmament Commission Guidelines on

International Arms Transfers of 1996, "Limitations on arms transfers can be found in international treaties, binding decisions adopted by the Security Council under Chapter VII of the Charter of the United Nations and the principles and purposes of the Charter." [para. 8] Moreover "Illicit arms trafficking is understood to cover that international trade in conventional arms, which is contrary to the laws of States and/or international law." [para. 7].[14] However, the General Assembly has not yet agreed on a set of explicit standards that provide clear and fair criteria for decisions on the international transfer of conventional arms. Such standards should at least reflect existing international obligations of States, as agreed in paragraphs 8 and 9 of the Guidelines, and provide for the right of self-defence as well as limit the freedom of States to authorize the transfer of weapons and munitions, including:

Monitoring and compliance with UN arms embargoes would greatly improve if national arms control systems were more consistent with existing international law.

- Rules of State responsibility prohibiting States from aiding and assisting other States in the commission of an internationally wrongful act, rules which are now codified in the International Law Commission's Articles on State Responsibility.[15]

- Rules of international criminal law prohibiting persons from aiding and abetting in the commission of an international crime. The "aiding and abetting" provision of the International Criminal Court Statute establishes criminal responsibility if a person aids, abets or otherwise assists in the commission or the attempted commission of a crime, including by providing the means for its commission.[16]

- Positive obligations of States to ensure respect for international humanitarian law and to cooperate in the protection and fulfilment of human rights beyond their borders. For example, the imposition of arms embargoes is another way in which the international community seeks to prevent breaches of the peace while also giving effect to its common Article 1 obligation under the Geneva Conventions, Article 1 of the UN Charter and the International Covenants on human rights.[17]

In this regard, many of the guidelines for international transfers of conventional arms agreed by the Disarmament Commission in 1996 are abstract and do not provide Member States with specific common criteria to ensure respect for existing agreed international norms. These guidelines have since been surpassed in providing such specificity by many regional agreements on international arms transfers and, given the gravity of the problem, are in need of urgent review. The 2001 UN Programme of Action on Small Arms and Light Weapons (UN PoA)[18] also acknowledges that there is an established body of international legal rules that will be relevant to the assessment of applications for export authorizations covering small arms and light weapons.[19] A growing number of States have expressed their support for elaborating common criteria based on such rules.[20]

The guidelines for international transfers of conventional arms agreed by the Disarmament Commission in 1996 are in need of urgent review.

Greater openness by States can contribute significantly to verification of compliance with UN arms embargoes. However, the provision of objective public information on military matters and arms transfers is often not made to the maximum degree possible consistent with national security needs. This can seriously hamper UN investigations of illicit

trafficking because it is harder to assess arms movements. Some States do not even report all their relevant transactions in their annual reports to the UN Register of Conventional Arms and do not report reliable customs data to the UN statistical services. The agreement in June 2005 to adopt a UN non-legal instrument on the marking and tracing of small arms and light weapons is a step forward, but currently this proposed instrument excludes ammunition and explosives and has an opt out clause for States to deny information. The vast majority of States favored a legally binding instrument, but a few States thwarted their efforts in the negotiations. These shortcomings should be addressed if ongoing UN investigations of arms embargo violations are to be improved.

Another example of the absence of rigorous common standards for effective national laws that undermines the ability of the United Nations to ensure compliance with its arms embargoes is the problem of import licenses or verifiable end-use/end-user certificates for international arms transfers. All too often, UN investigations show how such documents are fake, forged or tampered with and issued by unauthorized persons. The Organization should agree on common standards for such documents and for verifying their authenticity, as requested in June 2005 by a number of States during the UN Biennial Meeting of States on small arms and light weapons. In November 2004, the Organization for Security and Cooperation in Europe agreed on standard elements for end-use certificates and verification procedures. These offer a step forward, but could be strengthened by requiring the specific inclusion of data on whether any brokers or transport agents were to be used for the arms delivery, and also for delivery verification procedures. One practical measure is that the Secretariat could be tasked to maintain a central database of government officials authorized to sign end-user certificates and to assist UN investigative panels.

A key problem for verification of compliance with UN arms embargoes is the lack of stringent national controls on the activities of arms brokers and transport agents who are frequently found to engage in unauthorized diversion of arms.[21] In 1996, the Disarmament Commission agreed that: "*States should maintain strict regulations on the activities of private international arms dealers and cooperate to prevent such dealers from engaging in illicit arms trafficking.*"[22] Five years later, in 2001, a UN Group of Experts reported to the General Assembly on the feasibility of regulating arms manufacturers and dealers, including brokers and transporters, to prevent the illicit trafficking of small arms and light weapons. The delay in addressing this problem can be measured by the fact that in 1995, it had been shown how such dealers, brokers and transporters had supplied arms to those who perpetrated the 1994 Rwanda genocide, as well as to such actors who violated UN arms embargoes in Angola, the DRC, Liberia, Sierra Leone and other countries. In 2004, after some consultations with States and interested groups, the General Assembly decided to set up another Group of Government Experts after mid-2006 to examine how to prevent the illegal brokering of small arms and light weapons.[23] Despite a relatively high level of consensus by States as to the main forms of control, as reflected in a number of regional and multilateral agreements, the latest timetable means that any concerted action by States could take until 2008 or perhaps 2010 – fifteen years after the original expression of concern in the Disarmament Commission. The Security Council and General Assembly should be more proactive in addressing this problem by devoting more urgent time and resources to the development of necessary standards.

A key problem for verification of compliance with UN arms embargoes is the lack of stringent national controls on the activities of arms brokers.

Often UN investigative problems are compounded by lack of skilled capacity on the part of State regulators and law enforcement agencies, for example, too few customs officials are adequately trained to enforce the necessary regulations over the export and import of arms and to collect reliable data from ports. The Organization should be more proactive in encouraging bilateral and multilateral technical assistance programs to build such national capacity in accordance with high international standards. This is vital because the United Nations must rely upon Member States to monitor and enforce the implementation of embargoes in various ways such as through surveillance, data collection, inspections, and the investigation of allegations of violations.

A related challenge for effective verification is whether States make sufficient efforts to prevent corruption and bribery in connection with the transfer of arms. One measure is the extent to which States implement relevant recommendations of Interpol; another is whether States actively cooperate at the bilateral and multilateral levels as appropriate to share relevant customs information on trafficking in and detection of illicit arms and coordinate intelligence efforts. The United Nations could do more to encourage States to identify, apprehend and bring to justice all those involved in illicit arms trafficking.

Design and functioning of UN embargo verification mechanisms

All measures of verification depend first and foremost upon the specific mandate given by the appropriate authority. In the past, the purpose of UN embargoes was to modify the behaviour of, but not to punish or exact retribution from, the country or party under sanctions; to *minimize* the impact of conflict on vulnerable groups and neighbouring or other States. In 1991, the UN Sanctions Committee on the former Yugoslavia

was given a mandate that included the power to recommend measures in response to violations and to approve exceptions to the embargo. The UN Committees established since then (Libyan Arab Jamahiriya, Somalia, Haiti, UNITA in Angola, and Rwanda) have had similar mandates. More recently, UN embargoes such as those on Liberia, the DRC and Sudan have included measures to enable the freezing of assets and travel bans for individuals and entities proven to have violated the embargoes.

Sanctions Committees may be asked to (a) develop and improve guidelines for the implementation of measures imposed; b) collect and examine information submitted by States on actions they have taken for implementation with a view to making recommendations to the Council; (c) examine the Secretary-General's progress reports on implementation and to make appropriate recommendations to the Council; (d) deal with violations through consideration of information brought to their attention by States concerning violations, making periodic reports of violations to the Council (identifying where possible persons or entities, including vessels, reported to be engaged in the violations) and recommending appropriate measures in response; and (e) approve of exceptions on application by States to the measures imposed by the Security Council, for example, on grounds of significant humanitarian need. Greater thought needs to be given to the grounding and impounding of aircraft and other vessels that are repeatedly used to violate arms embargoes,[7] as well as to the prosecution of well-known arms embargo violators, and also to the use of "flags of convenience" by transport companies. As is the case with Interpol, the World Customs Union and the International Criminal Court prosecutor's office, the United Nations should seek the advice and active cooperation of the International Civil Aviation Organization and the International Maritime Organization on these and similar matters.

In accordance with the UN principles for verification, arms embargo agreements should provide for procedures and mechanisms for investigation, review and evaluation. Realistic resources and time-frames for such investigations and reviews should be agreed in order to evaluate compliance. Panels of experts with sufficient skills and capacity should be created whenever an arms embargo and corresponding Sanctions Committee are established by the Security Council and not, as sometimes happens, months later[24] or not at all when the humanitarian and security situation on the ground in the target country or countries has worsened. The process of setting up a panel should begin in the same Security Council resolution as that which imposes an embargo.

Panels of experts with sufficient skills and capacity should be created whenever an arms embargo and corresponding Sanctions Committee are established by the Security Council.

To be adequate and effective, a verification regime for an arms embargo agreement must cover all relevant weapons, facilities, locations, installations and activities. In practice, this is very difficult and the UN Sanctions Committee and investigative team leaders must decide what is most relevant within the limited time and resources available. Increasingly, investigations of alleged violations of arms embargoes are also carried out by UN field staff as a form of fact-finding, using liaison officers to maintain contact with armed forces and groups and develop relationships to build trust and benefit from improved data collection and freedom of movement for patrols. The monitoring of ports and border crossings requires an understanding of customs laws and procedures. This has been carried out in some cases by UN personnel and in others, under a UN mandate, by regional organizations or multinational coalitions that possessed the necessary resources to verify the presence, or absence, of compliance.

Verification methods ranging from mobile patrols and checkpoints along frontiers and monitors at airports and seaports to intercepts at sea, the use of maritime and aerial assets, including satellite surveillance, provided from national, multilateral and regional resources, has contributed to more effective implementation of the embargoes. In some instances, such as in Angola and the DRC, the United Nations has lacked sufficient resources to cover all airports and landing strips frequently enough. Enhanced telecommunications and air surveillance could improve the effectiveness of such monitoring. It is therefore vital that relevant structures in the United Nations establish coordination procedures and training for the close linkage between peacekeeping and security operations and traditional arms control and disarmament verification procedures.

To be adequate and effective, a verification regime for an arms embargo agreement must cover all relevant weapons, facilities, locations, installations and activities.

The skill and time required for UN panels of experts to carry out competent investigations needs to be reflected in UN institutional arrangements. The Security Council should establish such panels for extensive periods, preferably for at least a year, to allow them to conduct in-depth, non-discriminatory and comprehensive investigations both in the field and in those places suspected of being the sources and routes of illegal arms deliveries. An investigation of a single illicit deal might have to be conducted in several countries in different world regions because of the way trafficking networks operate. Too often panels have been given such short time periods and have too few personnel that they do not carry out what could become important investigations. The range of skills required should also be assessed carefully before panels are appointed. The trend towards appointing a range of specialists familiar with investigating

the arms trade, transportation, customs and finance to panels appears to be valuable, as is the use of experienced research consultants, and there needs to be a good mix of language skills, computer literacy, impartial legal knowledge and management and negotiating skills appropriate for the tasks. However, these skills could be wasted and a panel's work undermined if any appointed persons put their allegiance or hostility to the interests of their home state or any other state above that of the United Nations. Recruitment and selection criteria should be designed to assess this difficulty.

The Secretariat has developed databases on illicit arms trafficking and the violation of UN embargoes to support the work of the Sanctions Committees and the panels of experts. This should be reviewed and developed further so that the Organization does not waste valuable time and resources reconstructing files to investigate possible violators each time a panel is appointed. Experience has shown that some of the arms dealers, brokers and transporters named in UN reports for definite and probable violations of its arms embargoes are also named in other reliable reports or strongly suspected of violations on other countries. It would be worthwhile considering the purchase of certain reliable data or subscribing to key databases collected by impartial sources so that panels are not dependent on soliciting voluntary ad hoc contributions.

It should be recalled that in 1987 the UN Disarmament Commission received a number of proposals to improve systems of verification to achieve compliance with arms limitation and disarmament agreements, for instance: (a) the establishment of a verification database within the United Nations; (b) the development of a UN capacity to provide advice to negotiators respecting verification matters; (c) research into the process, structures, procedures and techniques of verification as well as the role of the United

Nations, beginning with a request to the Secretary-General to look into these and other matters with the assistance of qualified experts; (d) on a responsive basis, and with the consent of the parties to an arms limitation and disarmament negotiation or agreement, potential involvement by the Organization in the formulation and implementation of verification provisions of specific agreements; (e) the establishment of an integrated multilateral verification system within the United Nations; and (f) the setting up, under the UN aegis, of a mechanism for extensive international verification of compliance with agreements on reducing international tension and limiting armaments and on the military situation in conflict areas. These proposals should be further considered in the light of current circumstances and their implementation reviewed in order to improve systems of monitoring compliance with UN arms embargoes. For example, in post-conflict situations, regional arrangements may be made by affected States to verify limitations of arms imports into their border areas, and it would be useful for the United Nations to be involved in developing model procedures for such purposes.

Methods, Procedures and Techniques

The principle that verification arrangements should be implemented without discrimination can in practice be difficult when there is a shortage of resources and time to consider all views. On the one hand, UN investigative teams need to allocate time and resources to act with strict impartiality according to their mandate, and, on the other hand, State officials whom they approach for help should be cooperative, honest and as open as possible. Requests by UN investigative teams for inspections or information in accordance with the provisions of an arms embargo agreement should be as systematic and unbiased as possible, and States should consider such requests as a normal component of the verification process. If

a panel is seen not to be pursuing a possible violation case and is then accused of political bias, it needs to be in a position to provide an unbiased answer. Otherwise its credibility will be undermined. If a government repeatedly refuses to cooperate with a UN investigative team without a legitimate reason, the Security Council should impose secondary sanctions on that government.

Recent panel reports have been more explicit about the methodology and rules of evidence to be used in establishing a violation. The distinction between a possible violation, a probable violation and a definite violation has been more clearly explained in reports. While rules to ensure only the use of credible evidence have been established, there have still been disputes among officials regarding the nature of evidence. It would be wise to review this aspect of the work of panels.

The distinction between a possible violation, a probable violation and a definite violation has been more clearly explained in reports.

Improved mechanisms of communication and exchange should be created between UN investigative teams and the UN Sanctions Committee, and competent, independent and impartial bodies within civil society and individuals who have concrete information on possible embargo violations. Requirements of accuracy, discretion, confidentiality and witness protection need to be considered. Member States should be made aware that any attempts by their officials to impede such cooperation or punish civil society groups or individuals for providing what they deem to be reliable information will be reported to the Security Council and invoke counter action.

Where UN peacekeeping forces are deployed in a conflict zone in which the embargoed entity operates, skilled

members of that UN force should be assigned to protect, inspect and record serial numbers and markings of weapons and the markings of all ammunition and explosives that are found in the possession of, and seized or collected from, any person in the embargoed entity. It is distressing to find that, even sometimes nowadays, UN peacekeeping officials involved in demobilization, disarmament and re-integration programs have diligently recorded the serial numbers of weapons retrieved but have not recorded the corresponding markings, rendering the lists of serial numbers almost useless. Other times ammunition has been destroyed before markings are photographed and recorded. It is vital that reliable records and other observations and reliable reports on illicit traffic should be communicated without delay to the UN authorities and to the relevant UN investigative teams for analysis.

Stocks of seized illegal weapons and munitions should be safely destroyed during UN peace processes and embargo enforcement operations, and this can often be publicized to create public confidence. However, such destruction should only be carried out after digital photographic records have been taken of serial numbers and markings of all items to allow for tracing by the relevant authorities in the United Nations and Member States.

UN peacekeeping officials involved in demobilization, disarmament and re-integration programs have diligently recorded the serial numbers of weapons retrieved but have not recorded the corresponding markings.

As a necessary precaution, serial numbers and markings of weapons and markings on ammunition and explosives that are transferred into a conflict zone to an authorized entity, but where one or more of the embargoed entities also operates, should routinely be recorded by each Member State exporting, importing and transiting such items. The UN peacekeeping missions and UN investigative teams should be

allowed to conduct spot checks of those records and inventories. All too often, there is an absence of such records and inventories are kept hidden from UN investigators in circumstances where confidential access would pose little or no risk to national security.

The analysis of results and review of reported findings can sometimes involve strong differences of interpretation and opinion amongst panelists, members of the Sanctions Committee and UN Secretariat staff. It is vital that these differences are fully discussed in an impartial manner so that the Sanctions Committee can reach reasonable editorial solutions before UN investigative reports are released publicly. Every effort should be made by the Organization and Member States not to self-censor important facts and prevent uncomfortable facts being published as this merely encourages speculation and misunderstanding of the situation in the affected countries and undermines confidence in UN verification mechanisms.

Every effort should be made by the Organization and Member States not to self-censor important facts and prevent uncomfortable facts being published.

Donor countries should be encouraged to provide financial and appropriate material resources to ensure that the above needs are met. The costs of effective verification activities to ensure compliance with UN arms embargoes are small in relation to the savings – in public expenditure, development aid and most importantly human lives – that would be achieved if every embargo were fully respected.

It is doubtful that this list is exhaustive, but hopefully it will assist discussion in the United Nations to improve the verification of violations of its arms embargoes and compliance with such embargoes.

Notes

[1] Embargoes are also imposed by regional organizations, most notably by the European Union (EU) and the Organization for Security and Cooperation in Europe (OSCE). In April 2004, there were EU arms embargoes against eleven States: Afghanistan, Bosnia-Herzegovina, Burma (Myanmar), China, Democratic Republic of Congo, Iraq, Liberia, Sierra Leone, Somalia, Sudan and Zimbabwe. In 1993, the OSCE imposed a politically binding embargo on Armenia and Azerbaijan, aimed at "all deliveries of weapons and munitions to forces engaged in combat in the Nagorno-Karabakh area" (Decisions Based on the Interim Report on Nagorno-Karabakh, available online: http://projects.sipri.se/expcon/osceaz/barm.htm). An important expression of political will, such embargoes do not carry the weight of their UN counterpart if only because they are, by their very nature, regional in scope and can be thus undermined by countries outside the arrangement that may not subscribe to the same political view.

[2] S/RES/1572, 15 November 2004 (for a period of 12 months); S/RES/1584, 1 February 2005 (reaffirming the embargo).

[3] S/RES/1521, 22 December 2003 (for a period of 12 months); S/RES/1579, 21 December 2004 (renewed for a period of 12 months).

[4] S/RES/733, 23 January 1992, most recently reaffirmed in S/RES/1519, 15 December 2003 and S/RES/1558, 17 August 2004.

[5] S/RES/1493, 28 July 2003, targeting "all foreign and Congolese armed groups and militias operating in the territory of North and South Kivu and of Ituri, and to groups not party to the Global and All-inclusive agreement, in the Democratic Republic of Congo" (for a period of 12 months); S/RES/1552, 27 July 2004 (renewed for a period of 12 months).

[6] S/RES/1521, 22 December 2003, targeting Liberians United for Reconciliation and Democracy (LURD) and the Movement for Democracy in Liberia (MODEL), as well as "all former and current militias and armed groups" (for a period of 12 months); S/RES/1579, 21 December 2004 (renewed for a period of

12 months).

[7] S/RES/1011, 16 August 1995, targeting "non-governmental forces" inside Rwanda and persons in neighbouring States that intend to use arms and related materiel in Rwanda.

[8] S/RES/1171, 5 June 1998, targeting "non-governmental forces in Sierra Leone".

[9] S/RES/1556, 30 July 2004, targeting "all non-governmental entities and individuals, including the Janjaweed, operating in the States of North Darfur, South Darfur and West Darfur".

[10] S/RES/1390, 28 January 2002 (for a period of 12 months); S/RES/1455, 17 January 2003 (decision to improve the implementation of the measures over a further period of 12 months); S/RES/1526, 30 January 2004 (decision to improve the implementation of the measures over a further period of 18 months).

[11] In a recent resolution on the situation in Burundi, the Security Council expressed "its deep concern over the illicit flow of arms provided to armed groups and movements, in particular those which are not parties to the peace process under the Arusha Agreement" and called upon "all States to halt such flow" (S/RES/1545, 21 May 2004, para. 18).

[12] Article 41 confers upon the Security Council the power to call for a "complete or partial interruption of economic relations [...] and the severance of diplomatic relations" in response to a threat to or breach of the peace or an act of aggression. It is within the discretion of each State to decide the type of responsibility (administrative offence v. criminal offence) that attaches to a violation of the embargo by a private actor. In a resolution on the situation in Africa adopted in 1998, the Security Council encouraged Member States to adopt measures making the violation of mandatory arms embargoes a criminal offence (see S/RES/1196, 16 September 1998, para. 2).

[13] See for example, Amnesty International, "Undermining Global Security: EU arms exports", October 2004, and Control Arms Campaign, "Arms exports from the G8", June 2005.

[14] Guidelines for international arms transfers in the context of General Assembly resolution 46/36 H of 6 December 1991, UN Disarmament Commission, May 1996, *Official Records of the General Assembly, Fifty-first Session, Supplement No. 42* (A/51/42), 22 May 1996.

[15] Articles 16 and 41(2). The Articles were commended by the General Assembly and annexed to resolution 56/83, Responsibility of States for Internationally Wrongful Acts, UN document A/RES/56/83, 12 December 2001.

[16] Rome Statute, Article 25(3)(c) [emphasis added].

[17] The Question of the Trade, Carrying and Use of Small Arms and Light Weapons in the Context of Human Rights and Humanitarian Norms, Working paper submitted by Barbara Frey in accordance with Sub-Commission decision 2001/120, Economic and Social Council, UN Doc. E/CN.4/Sub.2/2002/39, 30 May 2002; also Prevention of human rights violations committed with small arms and light weapons, Preliminary report submitted by Barbara Frey, Special Rapporteur, in accordance with Sub-Commission decision 2002/25, Economic and Social Council, UN Doc. E/CN.4/Sub.2/2003/29, 25 June 2003.

[18] "Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All of Its Aspects", in Report of the United Nations Conference on the Illicit Trade in Small Arms and Light Weapons in All Its Aspects, New York, 9–20 July 2001, UN Doc. A/CONF.192/15.

[19] UN PoA, section 2, Article 11.

[20] Around fifty States have expressed support for the idea of an International Arms Trade Treaty based upon international norms, and many more States have called for international binding instruments for arms transfers.

[21] Brian Wood and Johan Peleman, in a 1999 study entitled The Arms Fixers, (available from www.nisat.org) enumerated many loopholes in existing national controls: the lack of specific provisions to regulate the brokering and transportation of arms; lax control on weapons stocks; acting as an agent between supplier and

buyer without the weapons entering the territory; using barter arrangements and offshore financing especially in tax havens; easily circumvented documentation requirements; using circuitous routes to conceal the true nature of cargoes; exploiting difficulties in enforcing customs controls, particularly in countries with long borders and limited resources. See also: Small Arms Survey 2004: Rights at Risk, Oxford: Oxford University Press, 2004, pp.143–146.

[22] UN Guidelines on International Arms Transfers, op.cit.

[23] UN document A/RES/59/86, 10 December 2004.

[24] As happened with the embargoes imposed on Rwanda, the Democratic Republic of the Congo, and Sudan, op.cit.

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Annex

Disarmament Commission's Sixteen Principles of Verification[1]

1. Adequate and effective verification is an essential element of all arms limitation and disarmament agreements.

2. Verification is not an aim in itself, but an essential element in the process of achieving arms limitation and disarmament agreements.

3. Verification should promote the implementation of arms limitation and disarmament measures, build confidence among States and ensure that agreements are being observed by all parties.

4. Adequate and effective verification requires employment of different techniques, such as national technical means, international technical means and international procedures, including on-site inspections.

5. Verification in the arms limitation and disarmament process will benefit from greater openness.

6. Arms limitation and disarmament agreements should include explicit provisions whereby each party undertakes not to interfere with the agreed methods, procedures and techniques of verification, when these are operating in a manner consistent with the provisions of the agreement and generally recognized principles of international law.

7. Arms limitation and disarmament agreements should include explicit provisions whereby each party undertakes not to use deliberate concealment measures which impede verification of compliance with the agreement.

8. To assess the continuing adequacy and effectiveness of the verification system, an arms limitation and disarmament agreement should provide for procedures and mechanisms for review and evaluation. Where possible, time-frames for such reviews should be agreed in order to facilitate this assessment.

9. Verification arrangements should be addressed at the outset and at every stage of negotiations on specific arms limitation and disarmament agreements.

10. All States have equal rights to participate in the process of international verification of agreements to which they are parties.

11. Adequate and effective verification arrangements must be capable of providing, in a timely fashion, clear and convincing evidence of compliance or non-compliance. Continued confirmation of compliance is an essential ingredient to building and maintaining confidence among the parties.

12. Determinations about the adequacy, effectiveness and acceptability of specific methods and arrangements intended to verify compliance with the provisions of an arms limitation and disarmament agreement can only be made within the context of that agreement.

13. Verification of compliance with the obligations imposed by an arms limitation and disarmament agreement is an activity conducted by the parties to an arms limitation and disarmament agreement or by an organization at the request and with the explicit consent of the parties, and is an expression of the sovereign right of States to enter into such arrangements.

14. Requests for inspections or information in accordance with the provisions of an arms limitation and disarmament agreement should be considered as a normal component of the verification process. Such requests should be used only for the purposes of the determination of compliance, care being taken to avoid abuses.

15. Verification arrangements should be implemented without discrimination, and, in accomplishing their purpose, avoid unduly interfering with the internal affairs of State parties or other States, or jeopardizing their economic, technological and social development.

16. To be adequate and effective, a verification regime for an agreement must cover all relevant weapons, facilities, locations, installations and activities.

[1] See *Official Records of the General Assembly, Fifteenth Special Session, Supplement No. 3* (A/S-15/3, para. 60).

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DDA OCCASIONAL PAPERS

No. 10, March 2006